Tarmo Johannes
Csound at schools: interactive Csound/Android based sound games to develop understanding of sound

General aim

Young people listen or rather hear enormous amount of music every day but how much do they actually listen? Do they notice what happens INSIDE the music, how much can they listen to the sound, have attention to the neat nuances that make music wonderful? The project tries to lead students' attention to sound by itself and help to understand how different combinations of harmonics influence the character of sound. It pulls students to active music making where everybody can take part in, without asking for any special skills, draw connections to knowledge learned physics class. And hopefully, since students get probably excited by the sound games – to learn so more efficiently.

The project is meant for students of upper classes (age around 15-17) who have learned some wave theory in physics. The event takes one lesson, 45 minutes.

The lesson consists of:

1. Introduction, getting ready the android applications and wifi connection
2. First sound game **"Csound drums"** - introduction to subject: students can play drum like sounds through their android device (computer receives the messages, plays them through loudspeakers), the system starts to change them slowly. So the listening goes step by step from beat to sound.
3. Small lecture: what is timbre – shortly about waves, how they sum up, video illustrations of harmonics and wave formation, live spectrogram of voice and flute (demonstrate how changes of dynamics and tone colors can be visible in the changes of spectrum of the sound).
4. Second sound game "**Harmonics control**" - every participant gets to control the amplitude of one harmonic. At first some exercises and demonstration how sound changes on different combinations of harmonics, then playing together – Tarmo Johannes improvises on the flute and students play along on the sound, changing the timbre of their common sound.

Description of sound games

Participants have to install android apps Csound drums and Harmonics control from http://tarmo.uuu.ee/android/kool/ to their android phones or tablets. I will prepare also front-ends for use in laptops (based on Processing); connect to local wifi that I will create.

1. Csound Drums

The application creates a very primitive drum machine. User can play there (beat and offbeat) by hand or make the device play by itself (button "Generate"). User can choose how many beats are played in a measure, how many subdivisions are in a beat, how regular are the beats, control volume and panning of the sound etc. The device makes some sound so that user has reference of his/her actions. The app sends signals about every single local beat and action via OSC messages to central computer that is connected to PA. The computer plays the sounds all together. Every 30th beat of a player is sent to computer as "long beat" or "long subdivision". Computer will synthesize the sound around 50 times slower than normally, opening up "the stomach" of a drum sound. Parts of the long sounds are used for latter spectral processing, so the overall sound moves more and more away from the initial beats to overall pulsating sound cloud.

The players are conducted with some simple commands (start, stop, generate, free, louder/softer) to

control the overall form of the piece.

2. Harmonics Control
The app by itself does not make sound. Player has to press button “Connect”, the computer registers the call and sends back, which harmonic the device will start to control. Then the player can control the amplitude of its harmonic by a slider on the app. The changes are send to computer that will play all the harmonics according to the amplitudes on apps, displays the state of all amplitudes and show also the resulting waveform. Players can play also a short attack on their harmonic (pressing button “Attack”) so they can create also rhythms and hear the pitch of their harmonic more clearly. In the piece, Tarmo Johannes will play along on the flute to add the element of live music, real instrument and iteraction with the generated sound.

The apps and Csound files can be found: http://tarmo.uuu.ee/android/kool/

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